# PROCEEDINGS OF THE CLUB

## Meeting of March 3, 1931

The meeting was called to order by President Sinnott at 8:15 P.M. at Columbia University, Schermerhorn Extension, with 125 members present.

An invitation was extended to the Torrey Club to meet at the Brooklyn Botanic Garden on Wednesday afternoon, March 18. The invitation was accepted by the club.

A special program of exhibits of educational material and demonstrations of research work in progress had been arranged by Dr. R. C. Benedict and others in the various laboratories of Schermerhorn Extension and in the Greenhouse. For the sake of a record, as well as to show the great latitude of subjects presented, the list is given herewith in full.

### Exhibits and Demonstrations

1. Teaching devices and helps:
   A. A laboratory study of variation. R. C. Benedict.
   B. Common vegetables in the classroom. R. C. Benedict.
   C. Models made by pupils. Frances Schiller.
   D. Diagrams for testing and drilling. Gertrude R. Twomey.
   E. Collections of cereals. G. M. Reed.
   F. Exhibit of a model of mitosis. Olga Hingsburg.
2. Experiments with the cabbage group. R. C. Benedict.
3. Histological differentiation among species. J. E. Adams.
4. Demonstration of some brine-loving algae. T. E. Hazen.
5. Forcing pitcher plants for class work. T. E. Hazen.
6. Demonstration of the importance of oxygen for plant growth. Barnard College Department of Botany.
7. *Bryophyllum crenatum* for study of vegetative reproduction. Barnard College Department of Botany.
8. Grafting *Coleus* as a laboratory exercise. Barnard College, Department of Botany.
9. Opening fern sporangia by means of glycerine. S. C. Bausor.
10. Stone cells in fruits. S. C. Bausor.
11. Thallus variations in *Marchantia*. Irene Hackett.
12. Growth and bud formation in moss protonema. Mildred McAusland.
13. Theoretical considerations of cell shapes. E. B. Matzke.
14. Flower variations in the chickweed, *Stellaria*. E. B. Matzke.
15. Demonstrations in general elementary botany. E. B. Matzke.
    A. Slime mould sporangia.
    B. *Pilobolus* and its light response.

C. *Aspergillus*—cultures differing in color.
D. *Monilia sitophila*—habit and spore formation.
E. Rusts—demonstrations and models.
F. Root pressure in *Fuchsia.*

16. Wood and leaf specimens of *Haematoxylon campechianum* from which haematoxylin was formerly obtained. W. C. Meyer.
17. Seedlings of *Achras zapota* from which chicle is obtained, blocks of chicle, machetes and gouges employed in tapping in British Honduras, together with *Pestalozzia* diseases. J. S. Karling and Estelle M. Hazard.
18. Demonstration of chemically simulated organisms. Illo Hein.
19. Demonstration of various smuts of cereal grains. Laura Kolk.
20. Demonstration of mosaic disease of tobacco. Bessie Goldstein.
21. Cryptogamic Laboratory: frieze of the Fox paintings of mushrooms with the Gibson collection of original drawings hanging beneath; also, a simple Wardian case for laboratory plants and an algal aquarium.
22. Exhibit of fungi parasitic on man. Laboratory of Medical Mycology and Department of Dermatology, College of Physicians and Surgeons.
23. Variations in *Pediastrum.* R. A. Harper.
24. Microprojection as applied to high school teaching. C. A. Gramet.
25. Cultures of the fungus *Colletotrichum* which parasitizes orchids in the tropics. Sylvia O. Segall.
26. Cultures of bacteria which cause black rot of cabbage and infected cabbage specimens. Dorothy Meier.
27. Demonstrations of fixed and stained plant preparations by the members of the Cytology Class. G. M. Watkins.
28. Dissected conifer embryos. G. M. Watkins.
29. Formation of starch grains from body of chloroplast in *Pellionia.* G. S. Avery.
30. Anatomy of the tobacco stem. G. S. Avery.
31. Anatomy of grain seedlings. G. S. Avery.
32. Demonstration of fern prothallia. J. T. Perry.
33. Exhibit of Polygonaceae. J. T. Perry.
34. Battery of water stills with quartz condensers. Mary L. Mann.
35. Zinc stimulation of *Aspergillus.* Mary L. Mann.
36. Calcium unessential for growth of *Aspergillus.* Mary L. Mann.
37. Fluctuation of leaf temperature with changing light intensity. Harold H. Clum.
38. Relative effects of red and blue light on phototropic bending. Robertson Pratt.
39. Antagonism between calcium and potassium nitrates. Robertson Pratt.

40. Influence of calcium on root-hair production. Robertson Pratt.
41. Protoplasmic streaming in cells of *Elodea*. Jennie Glazer.
42. Separation of chlorophyll *a* and chlorophyll *b*. Dora E. Marcy.
43. Sorghum seedlings as material for the demonstration of Mendel's law of heredity. Dora E. Marcy.
44. Spectroscope: absorption spectrum of chlorophyll. Ronald Bamford.
45. Bloodred fluorescence of chlorophyll. Ronald Bamford.
46. Growth of wheat as influenced by boron. Helen S. Morris.
47. Growth of wheat roots in relation to hydrogen-ion concentration of culture solution. Helen S. Morris.
48. Incubator for germination of seeds. Helen S. Morris.
49. Culture chamber with rotating table and thermostatic control. Helen S. Morris.
50. Conduction of stimulus in sensitive plant. Marjorie Cotton.
51. Anesthesia of sensitive plant. Alan Martin and E. A. Weiss.
52. Clinostat for equalizing stimulus of gravity. Marjorie Cotton.
53. Upward movement of dyes through xylem vessels. S. F. Trelease.
54. Auto-irrigators. E. H. Fulling.
55. Bud variation in *Coleus*. A. B. Stout.
56. Photosynthesis and respiration of aquatic plants. J. J. Copeland.
57. Effect of temperature on locomotion of Beggiatoa. J. J. Copeland.
58. Some hot spring sulphur bacteria from Wyoming. J. J. Copeland.
59. Cytological modifications resulting from culture solutions. Ronald Bamford.
60. Germination of wheat seeds for solution culture experiments. Ronald Bamford.
61. Corn seedlings in solution culture. S. F. Trelease.
62. Magnesium injury of wheat. S. F. Trelease.
63. Soil points for measuring water-supplying power of soils.
64. Porous cup atmometer for measuring evaporation as a climatic factor.
65. Synchronous motor time switch.
66. Rotating tables for assuring equal exposure of cultures to environmental conditions.
67. Steam operated Barnstead Still.
68. Leaf variation in Boston fern. R. C. Benedict.
69. Difference in dormancy between royal ferns collected in New Jersey and in Florida. R. A. Harper.
70. *Abutilon Thompsoni:* variegated and healthy forms.

At 10 o'clock refreshments were served by the entertainment committee.

Respectfully submitted,

FORMAN T. MCLEAN, *Secretary*

## Meeting of March 18, 1931

The meeting was called to order by President Sinnott at 3:30 P.M. at the Brooklyn Botanic Garden with 20 members present. In the absence of Dr. McLean the president appointed Dr. Graves secretary *pro tem.* The minutes of the meetings of February 18 and March 3 were read and approved.

The following candidates were unanimously elected to membership in the Club:

Dr. Anne H. Blinks, 447 E. 65th St., New York, N.Y.; Prof. William S. Cooper, University of Minnesota, Minneapolis, Minn.; Dr. George B. Cummins, Agric. Expt. Sta., Purdue University, Lafayette, Indiana; Miss Evelyn I. Fernald, Boyce Thompson Institute, Yonkers, N.Y.; Miss Sarah E. Hawthorne, 1021 Trinity Ave., New York, N.Y.; Dr. Wm. A. Kuntz, Citrus Experiment Station, Box 6, Lake Alfred, Florida; Miss Mildred C. McAusland, 114-35 148th Street, Jamaica, L.I., N.Y.; Dr. Fredda Doris Reed, Mount Holyoke College, South Hadley, Mass.; Dr. R. E. Stone, Ontario Agric. College, Guelph, Ont.; Dr. Alexander V. Tolstoouhov, 24 Arden Street, New York, N.Y.; Dr. Winona N. Welch, Dept. of Botany, DePauw University, 25 South Vine Street, Greencastle, Indiana; Prof. Wm. H. Weston, Jr., Farlow Herbarium, 20 Divinity Avenue, Cambridge, Mass.

For the scientific part of the meeting Mr. R. Bamford of Columbia University presented a paper entitled "Cytological Studies of Sterile Violet Hybrids." An abstract, kindly furnished by Mr. Bamford, follows.

A detailed description was given of morphological characters, pollen, chromosome numbers, and meiotic divisions preceding microspore formation of four sterile $F_1$ violet hybrids produced by cross pollinations. The hybrids are as follows:

*V. incognita* Brainerd, x *lanceolata* L.
*V. pallens* (Banks) Brainerd x *cucullata* Ait.
*V. silvatica* Fries x *striata* Ait.
*V. elatior* Fries x *striata* Ait.

(female parent given first in each case)

The results indicate that chromosome numbers *per se* are merely an accompanying feature of the phenomena of fertility and sterility. The cell as the fundamental, vital unit is stressed,

rather than the conception of homologous chromosomes, as being the solution to the incompatibility problem.

Respectfully submitted,
ARTHUR H. GRAVES, *Secretary pro tem*

## MEETING OF APRIL 7, 1931

The meeting was called to order by President Sinnott at 8:30 P.M. at the American Museum of Natural History with fifty members present.

The following candidates were unanimously elected to membership in the club: Mr. Hubert Vecchierello, O.F.M., St. Bonaventure's College, St. Bonaventure, N.Y.; Dr. Paul M. Patterson, University of South Carolina, Columbia, South Carolina; Dr. Flora A. Haas, A.S.T.C., Normal Station, Conway, Arkansas; Mr. Robert Stratton, 320 Hester Street, Stillwater, Oklahoma; Dr. Grace L. Clapp, Milwaukee Downer College, Milwaukee, Wisconsin.

Dr. William Crocker of the Boyce Thompson Institute gave an interesting talk on "Gas Injury To Plants," an abstract of which follows.

For a long time the citrus industry in California had been developing the proper color in their citrus fruits, especially lemons, by burning oil stoves at first in the storage houses and later at a distance from the storage houses, piping the gas into the houses. This industry insisted on the Bureau of Chemistry determining what gas was produced by these stoves that hastened the proper coloring of the lemons. In 1923, Dr. Denny made a study of this problem and found ethylene very highly effective in the coloring of the citrus fruit and that this hastened coloring was accompanied by 3-fold increases in respiration. He could apply it in the low concentrations ranging from one part in 5,000 of air to one part in a million with almost equally good results. Ethylene is now in general use in the citrus industry. Ethylene has been shown effective in hastening the coloring or ripening of many other fruits and has promise of considerable commercial application. Amongst the superstimulants found by Denny for dormant plant buds, a derivative of ethylene, ethylene chlorhydrin, is one of the best, if not the best.

All of the work, both on plants and animals, indicates that ethylene is an anaesthetic par excellence and has a very low degree of toxicity. In plants, in general, it acts as a stimulant, inducing growth in certain regions of the plant or accelerating it in other regions where growth is already occurring. It also hastens

respiration and accelerates the decomposition of chlorophyll in some fruits and leaves. Ethylene injury to plants can be distinguished from the injury caused by such toxic gases as sulphur dioxide, hydrogen sulphide, and ammonia. The latter gases cause the rapid killing of tissue, while ethylene causes injury largely by stimulating growth, or metabolism, and never shows quick killing or burning of the tissue. It stimulates growth of the abscission layers which produce the fall of petals or leaves or the extra growth on the upper side of the petioles of many plants which leads to epinastic response. It causes the development of intumescent growth on some stems and roots. In the rose, gardenia, and other leaves it causes the decomposition of chlorophyll along the midrib and the main veins. The chlorosis thus produced is just opposite to that produced by old age or by iron deficiency. In the latter cases the chlorophyll disappears between the veins rather than at the veins.

Since amounts of ethylene in the air that are far beyond chemical detection produce marked injuries in plants, a number of plants may be used as detectors of ethylene. Such test plants must be very sensitive to ethylene and must respond very quickly in order to be sure that they will detect any amount that will do serious injury to the most sensitive greenhouse plants and detect it before such injury can occur. In the work to date, a vigorously growing tomato plant has proved to be the simplest and best ethylene detector for this work. It will respond by epinastic growth of the leaves to about one part of ethylene in three millions of air and the response becomes visible to the eye within six hours. This is fully as sensitive as any other plant commonly grown in the greenhouse and the response is more rapid than the response in most other plants.

Doctors Zimmerman, Hitchcock and Crocker have made a study of more than 100 species and varieties of plants commonly grown in greenhouses. For these the critical concentration, the necessary time, and the nature of the response have been recorded.

Some plants are extremely resistant to illuminating gas. This is especially true of the ferns. Various varieties of the Boston fern endure concentrations up to 25 per cent of the atmosphere for many days without injury. The cyclamen is also very resistant, including both the flowers and the foliage. The cyclamen will withstand one per cent for three days without any apparent injury to flowers or foliage. Some greenhouse plants are extremely sensitive to illuminating gas. One part of ethylene in three millions of air will cause the yellowing of all of the leaves of Jerusalem cherry with three days' treatment followed by two or three days in pure air. It will also stimulate the fall of the cherry in a peculiar way, that is, by developing an abscission layer in the peduncle which causes the peduncle to fall with the cherry. Falling of

the cherry due to old age leaves the peduncle on the plant. With long exposure (3 to 6 days) to illuminating gas, the rose is also sensitive to relatively low concentrations. The leaves are more sensitive than the flower buds and in low concentrations show the gradual yellowing of the leaflets along the main rib and the side veins, finally leading to leaf and leaflet fall. This response will take place in dilutions of ethylene as high as one part in one million to one part in two millions of air with sufficient time of exposure. The lilies are somewhat less sensitive and show a killing of the bud but no injury to the foliage, especially in the higher dilutions. It has often been claimed for lilies, tulips, narcissi, and other liliaceous forms that the gas causes a distortion of the leaves. This is not true in any liliaceous forms studied except the paper white narcissus. In concentrations of ethylene of one part in 400,000 of air or greater, the end of the younger leaves of this plant rolls up into a coil, forming several complete circles. In higher dilutions of the gas only the buds are injured. In low concentrations of ethylene the vegetative growth is inhibited in most of the liliaceous forms during the time that they are in the gas but the growth proceeds again as soon as the plants are removed from the gas. If buds are already developed they are killed. The tulip is considerably more resistant to gas than other liliaceous plants but here, too, the bud is the most sensitive part and there is no injury to the foliage except reduction in its rate of growth. There is considerable varietal difference in the sensitiveness of tulips. These are only a few of the many plants that have been studied as to the effect of ethylene upon them.

From this knowledge of the symptoms produced by illuminating gas, along with the relative sensitiveness of various greenhouse plants, one can inspect a greenhouse during the time of injury and determine whether it is illuminating gas injury or other injury. Such a diagnosis can be further confirmed by placing tomato plants in the greenhouse as gas detectors.

Considerable damage has been claimed by various florists from illuminating gas. This work puts into the hands of the florist the best way of determining whether gas is present in the greenhouse at any time and thereby protects him against a continual period of injury from gas. It has also emphasized to the gas companies the extreme danger of injury to greenhouses from leaks in their mains in the neighborhood of greenhouses and is leading them to adopt precautionary measures commensurate with the danger.

The meeting adjourned for refreshments at 9:45 P.M.

Respectfully submitted,

FORMAN T. MCLEAN, *Secretary*